N60087.AR.000574
NAS BRUNSWICK
5090.3a

RESTORATION ADVISORY BOARD MEETING
NAS BRUNSWICK, MAINE

October 31, 1996

ATTENDEES:

NAME	ORGANIZATION	PHONE
F. Carter	CO - NASB	
J. Caruthers	NASB	
J. Bond	NASB	
F. Evans	Northern Division	
J. Dunleavy	Northern Division	
B. Lim	USEPA	
N. Beardsley	MEDEP	
D. Messier	MEDEP	
R. Heath	MEDEP	
S. Mierzykowski	USFWS	
C. Lepage	BACSE Consultant	
M. Battle	EA Engineering	
J. Brandow	ABB-ES	
C. Dricot	ABB-ES	

MEETING DATE: October 31, 1996, 8:30 a.m.

MEETING LOCATION: NAS Brunswick

I. INTRODUCTION

The Restoration Advisory Board (RAB) meeting was opened by Fred Evans (NORTHDIV), who passed out copies of the agenda.

II. PROPOSED PLANS AND RECORDS OF DECISION

A. Sites 4, 11, 13 and Eastern Plume

The public meeting was held on October 17, 1996. The public comment period ends on November 7, 1996. Carolyn Lepage (BACSE) informed the Navy that the BACSE group's comments were covered in Susan Weddle's verbal comments at the public meeting. The BACSE group will not be supplying written comments unless the Navy prefers it. Fred Evans said that the BACSE group's verbal comments will be included in the Responsiveness Summary.

The Navy intends to submit the draft ROD for Sites 4, 11 and 13 to the RAB in December. There will be a 30-day review period. The Navy is hoping for a signature during the second quarter of FY1997.

B. Site 2

The Proposed Plan/ ROD for Site 2 is scheduled for the fourth quarter of FY1997 (Attachment 1). The Navy is waiting for the final report from the U.S. Fish and Wildlife Service (USFWS) fish tissue study before proceeding with the Site 2 Proposed Plan. Steve Mierzykowski (USFWS) highlighted the results of the report. The study was originally conducted because of concerns over possible elevated trace metals in fish tissue in Mere Brook and Picnic Pond. The study results show that copper concentrations are elevated but not unusually high and not causing an ecological risk. Mercury has been found in seeps but not in fish tissue. For organics, PCBs were not found in fish tissue from either Mere Brook or Picnic Pond. DDT concentrations were quite low. Dieldrin and chlordane were found in a few fish but also at low concentrations. The sediment samples collected for toxicity testing were considerably less contaminated than sediment samples originally collected during the RI, when PAHs in sediments were at 380 ppm. Overall, there is no apparent concern in terms of habitat or ecological risk.

Richard Heath (MEDEP) asked if long term monitoring had been occurring at Site 2 since MW-212 was included in the annual report. The Navy noted that the well in question is actually MW-NASB-212, which was installed to replace piezometer 107 and is in the same location as CP149. Fred Evans has faxed the survey results for the new well to MEDEP. Well MW-212 at Site 2 is not currently being sampled.

The Navy's proposed plan for Site 2 will include installation of a new monitoring well near the toe of the slope of the landfill, adding Site 2 wells to the current LTMP, removal of surface debris, and regrading/revegetating the existing face of the landfill. The current forested cover on the top of the landfill will be maintained.

III. LONG TERM MONITORING

A. 1995 Annual Report Recommendations

As has been previously discussed, the Navy is deleting cyanide analysis from the long term monitoring program. In addition, piezometers P-111, P-112, P-120, and P-132 are being deleted. The changes will be in place for the November sampling event (Nov. 4-18). The Navy has received permission to sample the off-site wells (MW-312, MW-316A&B, MW-317A&B, P-121, and P-123) and they will be sampled at the same time as the November event (Attachment 2).

Some of the sediment sampling points at Site 9 will be under several feet of water during the November sampling event due to the construction of the retention pond; therefore, it was decided that sediment samples will not be taken from those locations in November. Further discussion on whether to replace these sample locations will take place at a future meeting, after the pond has been established. In addition, a single surface water sample will be taken at each impoundment during the November sampling event.

B. Extraction Well Issues

1. Natural Gamma Logging

The results of the natural gamma logging conducted in EW-1, EW-2, and EW-4 were issued (Attachment 3). The results show the current pump locations versus their original placement when the wells were having significant problems with fines.

Extraction wells 3 and 5 were not gamma logged.

2. MW-311 Direct-Push Investigation

A summary of the direct-push sampling activities was handed out (Attachment 4). The higher concentrations of VOCs in the shallow sample at location DP-02 have been confirmed by the laboratory which rechecked field reports and chain of custody records. It was agreed that the direct push sampling will be repeated at DP-02 during the direct push sampling at the NEX and seep samples will be taken during the November LTM sampling event. Richard Heath, Carolyn Lepage and Sue Chase will be selecting the seep sample locations within the next two weeks

3. Well Packers

A packer test will be performed on extraction well EW-5 to determine whether the effective zone of capture from the deeper zone can be improved (Attachment 5). The inflatable packers are not designed to be used for weeks at a time, but no better alternative has been identified. The pumping test will be conducted for 3 days to monitor the extraction rate and compare the results of a fully screened versus a packered well. There will be a week of shutdown to get back to steady state (i.e., groundwater elevation.). Transducers will be placed above and below the packer to monitor the influence, however, hydraulic conductivity values will not be recalculated. Piezometer locations around the extraction well will be used as monitoring points.

It was agreed to proceed with the packer testing. If the pilot test is successful, the packer technology will be used on additional extraction wells. If not, the Navy may consider installing new wells screened in specific zones.

IV. OTHER ISSUES

A. Geostatistics/GEOEAS

Richard Heath asked if geostatistics would be used to redesign the long term monitoring program. Fred Evans replied that the RAB has three choices for how to proceed:

- revise the LTMP to incorporate paperwork changes;
- revise the LTMP to incorporate new Data Quality Objectives (DQOs) and Data Quality Assessment Criteria; include results of geostatistical analysis as they become available;
- Perform geostatistical analysis first , then update LTMP and incorporate DQOs.

It was also noted that the next iteration of the LTMP will not be the last one. After some discussion, it was agreed to have EA start developing the geostatistical analysis now; setting DQOs and overall policy will take a lot of time. The paperwork for the November geostatistics course was not put in on time. Bob Lim will check to see if the USEPA computer lab is available in January for the course. It was noted that the TAG representative can attend as a representative of the citizens' group but not as a private consultant. The Navy would have a problem paying for a private contractor to attend the course for free.

B. MEG Issue

The USEPA attorney is conducting a peer review of the MEG issue. The Loring Project Manager told Bob Lim that the November 1 deadline for a decision will be missed. The decision could affect the cleanup criteria for vinyl chloride which will be an issue at Sites 1 and 3 and Site 9, and may become an issue at the Eastern Plume. Therefore, it could affect the schedule for the Sites 4, 11, and 13 Draft ROD.

V TECHNICAL AND RAB MEETINGS

A Technical Meeting is scheduled for Tuesday December 17, 1996 at 9:00 a.m. Bob Lim would like to discuss the long-term monitoring program as an agenda item and start the legwork on revising the program. USEPA will be providing comments on the entire monitoring network.

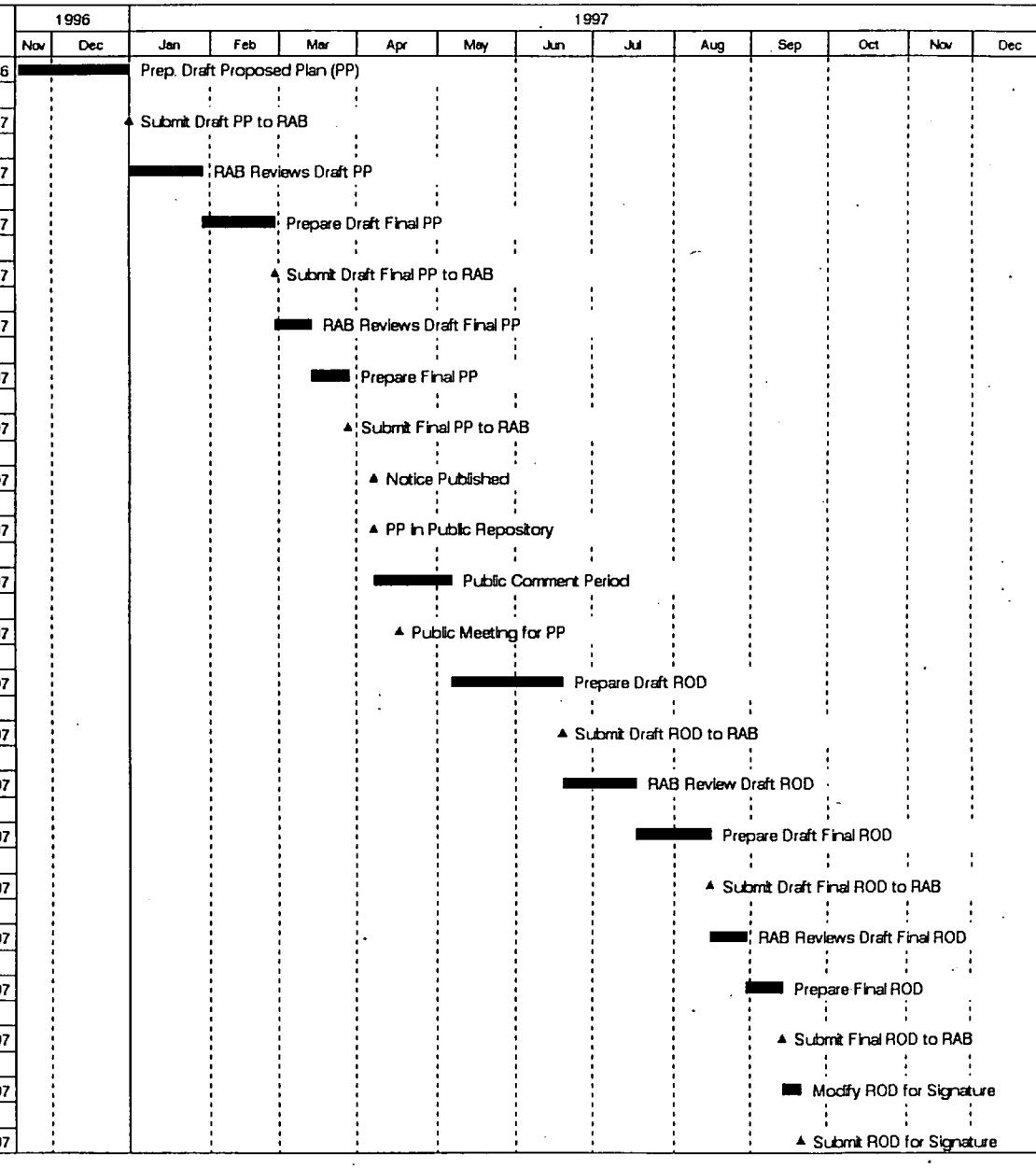
The next quarterly RAB meeting is scheduled for Thursday January 30, 1997 at 8:30 a.m.

NAS BRUNSWICK

SITE 2

PROPOSED PLAN AND ROD

Task Name	Start Date	End Date
Prep. Draft Proposed Plan (PP)	18-Nov-96	31-Dec-96
Submit Draft PP to RAB	2-Jan-97	2-Jan-97
RAB Reviews Draft PP	2-Jan-97	29-Jan-97
Prepare Draft Final PP	30-Jan-97	27-Feb-97
Submit Draft Final PP to RAB	28-Feb-97	28-Feb-97
RAB Reviews Draft Final PP	28-Feb-97	13-Mar-97
Prepare Final PP	14-Mar-97	27-Mar-97
Submit Final PP to RAB	28-Mar-97	28-Mar-97
Notice Published	8-Apr-97	8-Apr-97
PP in Public Repository	8-Apr-97	8-Apr-97
Public Comment Period	8-Apr-97	6-May-97
Public Meeting for PP	17-Apr-97	17-Apr-97
Prepare Draft ROD	7-May-97	18-Jun-97
Submit Draft ROD to RAB	19-Jun-97	19-Jun-97
RAB Review Draft ROD	19-Jun-97	17-Jul-97
Prepare Draft Final ROD	18-Jul-97	14-Aug-97
Submit Draft Final ROD to RAB	15-Aug-97	15-Aug-97
RAB Reviews Draft Final ROD	15-Aug-97	28-Aug-97
Prepare Final ROD	29-Aug-97	12-Sep-97
Submit Final ROD to RAB	15-Sep-97	15-Sep-97
Modify ROD for Signature	15-Sep-97	19-Sep-97
Submit ROD for Signature	22-Sep-97	22-Sep-97



10/30/96

2ppnew

RESTORATION ADVISORY BOARD MEETING
NAVAL AIR STATION, BRUNSWICK, MAINE
31 OCTOBER 1996

SCHEDULE FOR MONITORING AND SAMPLING
EVENT 7 (NOVEMBER 1996)

OVERVIEW

- Monitoring/Sampling Event 7 will be completed from 4-18 November 1996.

PROGRAM ADDITIONS

- Off-site wells MW-312, MW-316A, MW-316B, MW-317A, MW-317B, and piezometers P-121 and P-123 will be sampled.

- New gauging stations have been added along Mere Brook and tributaries at Sites 1 and 3 and Eastern Plume to correlate surface water elevations to ground-water elevations.

PROGRAM DELETIONS

- Effective this event, cyanide analyses will no longer be required at any of the long-term monitoring sites.

- Piezometers P-111, P-112, and P-132 will no longer be sampled; these locations will continue to be monitored to obtain water levels.

PRELIMINARY SCHEDULE

ACTIVITY	SITE(S)	DATE(S)
Water Level Gauging	All	4-5 NOV 1996
Surface Water/Sediment/Seep Station Sampling	Sites 1 &3	6 NOV 1996
Ground-Water Sampling	Sites 1 & 3	7-9 NOV 1996
Ground-Water Sampling	Eastern Plume	11-14 NOV 1996
Surface Water/Sediment/Leachate Station Sampling	Site 9	15 NOV 1996
Ground-Water Sampling	Site 9	16 NOV 1996
Ground-Water Sampling	Building 95	18 NOV 1996
Treatment System Sampling	Building 50	18 NOV 1996

ABB
ASEA BROWN BOVERI

Date: 6 August 1996

To: Jeff Brandow and Peter Hall

From: Scott F. Calkin

Subject: Natural Gamma Logging Results of Eastern Plume Extraction Wells EW-1, EW-2, and EW-4, Naval Air Station Brunswick, Brunswick, Maine

---

Introduction

This memorandum serves to document the results of natural gamma logging conducted at Naval Air Station Brunswick in Brunswick, Maine. Borehole logging was completed on Thursday July 25, 1996 in extraction wells EW-1, EW-2, and EW-4, all located within the Eastern Plume. Natural gamma logging was implemented in order to better evaluate stratigraphy spanning the well screens of each extraction well. Recently, silt and fine sand have been entering the Groundwater Treatment Facility. Silt and fine sand determined to be originating from these wells has clogged filters and damaged other facility equipment. Approximately 35 gallons of silt and fine sand were removed from the treatment system. Results from geophysical logging will be used to evaluate possible corrective action for these wells in order to prohibit further introduction of fine grained sediments to the Groundwater Treatment Facility systems.

Equipment and On-site Personnel

Natural gamma logging was conducted with a Mount Sopris MGX Data Logger and a natural gamma logging tool. Data were saved to a field computer. Elevated natural gamma counts within a borehole spanning unconsolidated materials typically indicate the presence fine grained sediments such as clay or clayey silt. Two logging runs were conducted in each borehole. Logging speeds ranged from seven to ten feet per minute. Winch cable and the logging tool were decontaminated with a deionized water rinse following the final logging run in each borehole.

Logging was conducted by Scott Calkin (ABB-ES). Activites were overseen by EA representatives Mike Chase and Sue Chase and by NASB Environmental Coordinator Jim Caruthers.

Results

Natural gamma logging results are discussed individually for each extraction well in the following paragraghs. All depths presented in the following discussions are referenced to the top of six-inch diameter steel casing. Logging results are shown in Figure 1. Geologic logs provided by OHM are also found attached to this memorandum for reference. There are some general observations to be made when the data is evaluated collectively. Natural gamma data from each borehole strongly suggests that stratigraphy is vertically non-homogenous. Numerous fine-grained units were noted in the screened intervals. Materials from these layers could enter a 15 slot well screen. When total depth had been reached in all boreholes, the bottom was tapped with the natural gamma tool. The bottom of all extraction wells were hard suggesting that little silt has accumulated in each sump. However more importantly, it

appears that each well pump was positioned adjacent to very silty portions of the formation which may be causing silt and fine sand to enter the treatment system.

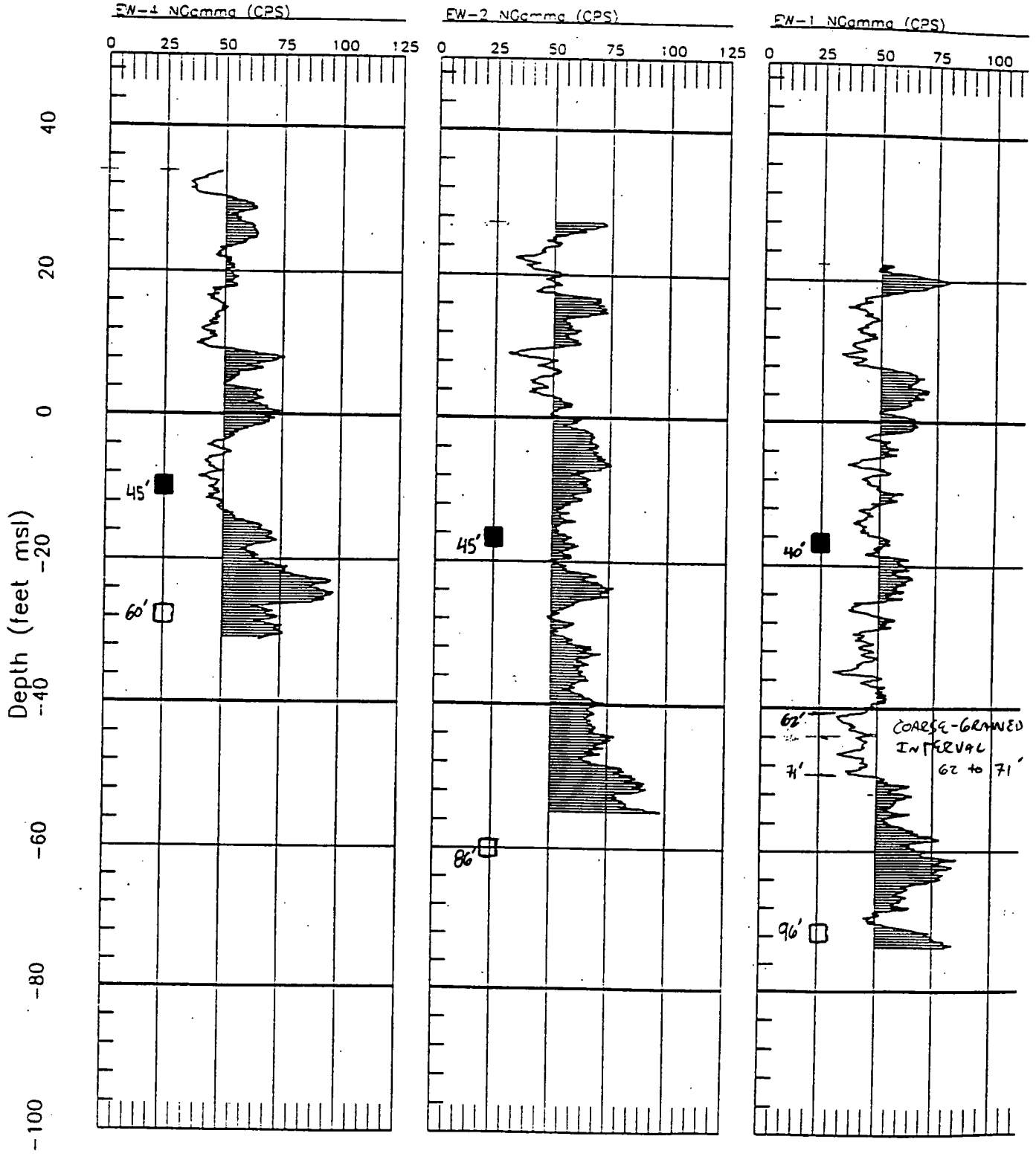
EW-1 Results. EW-1 was logged to a depth of 99.5 feet. Several silty horizons were profiled within the borehole. Natural gamma results indicate the presence of finer grained sediments along the borehole at the following depths below the steel casing: 4.8 to 7.8 feet, 17.8 to 27.3 feet, 44.6 to 50.6, 76.3 to 94.1 feet, and 96.8 to 99.5 feet. Coarser intervals along the borehole include the following: 37.0 to 44.1 feet, 54.5 to 61.6 feet, and 66.2 to 74.5 feet. Based on logging results and the documented location of the pump (98.6 feet) it appears that it was positioned adjacent to a silty portion of the formation.

EW-2 Results. EW-2 was logged to a depth of 85.6 feet. Silty horizons were logged within the borehole. Natural gamma results indicate the presence of finer grained sediments along the borehole at the following depths below the steel casing: 13.5 to 20.1 feet, 31.0 to 42.6 feet, 51.9 to 57.1, and 62.3 to 85.6 feet Coarser intervals occur along the borehole at the following intervals: 20.8 to 31.0 feet and 43.1 to 51.5 feet. Based on the documented position of the pump intake (86.0 feet) it appears that it was located adjacent to a silty portion of the formation.

EW-4 Results. EW-4 was logged to 68.5 feet. Several silty horizons were profiled within the borehole. Natural gamma results indicate the presence of finer grained sediments along the borehole at the following depths below the steel casing: 7.2 to 13.7 feet, 27.7 to 39.6 feet, and 51.3 to 64.1 feet. Coarser intervals along the borehole include the following: 13.7 to 27.7 feet and 41.2 to 51.3 feet. Based on the documented position of the pump intake (60.0 feet) it appears that it was located adjacent to a silty portion of the formation.

sfc/sfc

Well Name:
File Name: XSECTsm
Location:
Elevation: 0 Reference: Ground Surface



■ INDICATES BOTTOM OF PUMP AND PUMP INTAKE LOCATION AS OF 7/22/96.

□ FORMER PUMP LOCATION BEFORE 7/22/96.

OHM Corporation

VISUAL CLASSIFICATION OF SOILS

Project Number: 16527
Project Name: Brunswick Naval Air Station
Borehole Number: EW-1

Elevation: _____ Location: Brunswick, ME
Engineer/Geologist: Aaron Esselstyn GWL: Depth 10.5 ft BGS Date: October 27, 1994
Drilling Co.: Northeast Diamond Drilling Date/Time: _____ Date Started: Oct. 27, 1994
Driller: Scott Fisher Casing Size/Depth: _____ Date Completed: Oct. 28, 1994
Drilling Method: Rotary 3 1/4 ID/NW Casing Date Backfilled: Oct. 28, 1994

DEPTH (FEET)	SAMPLE NUMBER	BLOWS ON SAMPLER PER 6 INCHES	RECOVERY (INCHES)	DESCRIPTION	USCS SYMBOL	GRAPHIC LOG	REMARKS
5							
10	S-1	5-11 11-14	20"	Tan & brown medium to fine SAND (wet, medium dense)			▼ PID=NC
15	S-2	6-8 8-7	12"	Brown fine SAND, Clayey Silt (wet, medium dense)			PID=NC
20	S-3	wor	24"	Gray CLAY, trace of Silt (wet, very soft)			PID=NC
25	S-4	wor-wor 2-4	24"	SAA with 3" of fine gray SAND (wet, soft)			PID=NC
30	S-5	3-10 10-8	18"	Gray fine SAND, Silty Clay lense at 9" (wet, medium dense)			PID=NC
35	S-6	6-6 8-10	18"	Fine gray SAND interbedded with Silty Clay lenses (wet, medium dense)			PID=NC
40	S-7	6-4 3-5	24"	SAA (wet, loose)			PID=NC
45	S-8	7-11 14-14	18"	Gray CLAY, trace of Silt (wet, medium dense)			PID=NC
50	S-9	8-5 7-12	18"	Gray fine SAND to Silty Clay (wet, medium dense)			PID=NC
55		S-10 11-13	24"	Gray fine SAND, trace of Clay (wet, medium dense)			PID=NC
60	S-10	13-15 18-21	24"	Brown fine SAND, trace of Silty Clay (wet, dense)			PID=NC
65	S-11	wor-wor 3-3		SAA (wet, very loose)			PID=NC
70	S-12	3-7 10-18	5"	Brown fine SAND (wet, medium dense)			PID=NC
75	S-13	7-17 22-40	24"	SAA (wet, dense)			PID=NC
80	S-14	7-10 13-18	20"	Gray very fine SAND, trace of Silt at bottom (wet, medium dense)			PID=NC
85	S-15	wor-wor 4-11	15"	Gray Clayey SAND (wet, very soft)			PID=NC
90	S-16	wor	20"	Gray Silty CLAY (wet, very soft)			PID=NC
				E.O.B. 92 ft.			

NOTE: wch = weight of hammer wor = weight of rod PID background reading = Non-detect (NC)

▽ = water level at time of drilling
▼ = water level measurement
SAA = Same as above

OHM Corporation

VISUAL CLASSIFICATION OF SOILS

Project Number 18527
Project Name Brunswick Naval Air Station
Borehole Number EW-2

Page 1 of 1

Elevation ____ Location Brunswick, ME
Engineer/Geologist Aaron Esser GWL: Depth 18 ft bgs Date October 26, 1994
Drilling Co. Northeast Diamond Drilling Date/Time ____ Date Started Oct. 26, 1994
Driller Scott Fisher Casing Size/Depth ____ Date Completed Oct. 27, 1994
Drilling Method Rotary 3.25 ID/NW Casing Date Backfilled Oct. 27, 1994

DEPTH (FEET)	SAMPLE NUMBER	BLOWS ON SAMPLER PER 6 INCHES	RECOVERY (INCHES)	DESCRIPTION	USCS SYMBOL	GRAPHIC LOG	REMARKS
							PID=ND
5							
10							
15	S-1	wor-wor / wor-wor	24"	Dark gray Clayey Silt, trace of fine Sand (wet, loose)			PID=NC
20	S-2	wor-3 / 3-4	18"	Dark gray Clayey SILT, and light brown fine SAND lenses (wet, loose)			PID=NC
25	S-3	1-1 / 1-3	16"	Lt. gray to tan very fine SAND, and Clayey SILT (wet, loose)			PID=NC
30	S-4	1-3 / 5-5	15"	Lt. brown fine SAND, interbedded with Clayey Silt (wet, loose)			PID=NC
35	S-5	wor-wor / wor-4	17"	Dark gray Clayey SILT, trace of fine Sand (wet, soft)			PID=NC
40	S-6	wor-3 / 7-11	24"	Lt. brown recosh (Fe III) fine SAND (wet, medium dense)			PID=NC
45	S-7	23-21 / 41-50	18"	Lt. brown to yellowish brown fine SAND (wet, medium dense)			PID=NC
50	S-8	3-8 / 16-19	20"	Lt. brown recosh (FE III) fine to very fine SAND, 3" of tan very fine SAND (wet, medium dense)			PID=NC
55	S-9	wor-3 / 4-5	13"	Lt. brown fine SAND, and Silty Sand lenses (wet, loose)			
60		8-8 / 10-18	NR				
65	S-10	2-4 / 10-20	24"	SAA (wet, medium dense)			PID=NC
70	S-11	7-7 / 17-21	18"	SAA, turning to gray fine Silty SAND last 10"			PID=NC
75				E.O.B. 71 ft.			No odor or sheen was observed during drilling.

Notes: won = weight of hammer wor = weight of rod PID background reading = Non-detect (ND)

▽ = water level at time of drilling
▼ = water level measurement
SAA = Same as above

OHM Corporation

VISUAL CLASSIFICATION OF SOILS

Project Number 18527

Project Name Brunswick Naval Air Station

Borehole Number EW-4

Elevation _____ Location Brunswick, ME Page 1 of 1

Engineer/Geologist Aaron Esser GWL: Depth 10.5 ft bgs Date October 28, 1994

Drilling Co. Northeast Diamond Drilling Date/Time _____ Date Started Oct. 28, 1994

Driller Scott Fisher Casing Size/Depth _____ Date Completed Oct. 28, 1994

Drilling Method Rotary 3.25 ID/NW Casing Date Backfilled Oct. 28, 1994

DEPTH (FEET)	SAMPLE NUMBER	BLOWS ON SAMPLER PER 6 INCHES	RECOVERY (INCHES)	DESCRIPTION	USCS SYMBOL	GRAPHIC LOG	REMARKS
5							
10	S-1	4-4 6-8	14"	Grayish brown Silty SAND, and gray Silty Clay lenses (wet, medium dense)			▼ PID=NO
15	S-2	wor-wor wor-1	13"	Gray Clayey SILT, and Silty SAND; trace of very fine Sand (wet, very loose)			PID=NO
20	S-3	1-2 2-1	15"	Greenish gray to olive gray Clayey SILT trace of very fine Sand (wet, very loose)			PID=NO
25	S-4	2-2 5-3	16"	SAA			PID=NO
30	S-5	wor-2 3-5	18"	Lt. brown fine SAND, and 2" gray Clayey Silt (wet, loose)			PID=NO
35	S-6	2-8 5-5	15"	2" gray Clayey SILT, and lt. brown fine SAND (wet, medium dense)			PID=NO Fine sand at the toe of split spoon
40	S-7	1-1 3-7	16"	Grayish brown very fine SAND, and some Silty Clay (wet, loose)			PID=NO
45				E.O.B. 42 ft.			

Notes: won - weight of hammer wor - weight of rod No sheen or floating product was observed on the water. PID readings of the soil cuttings were non-detect; soil cuttings were used to backfill the borehole.

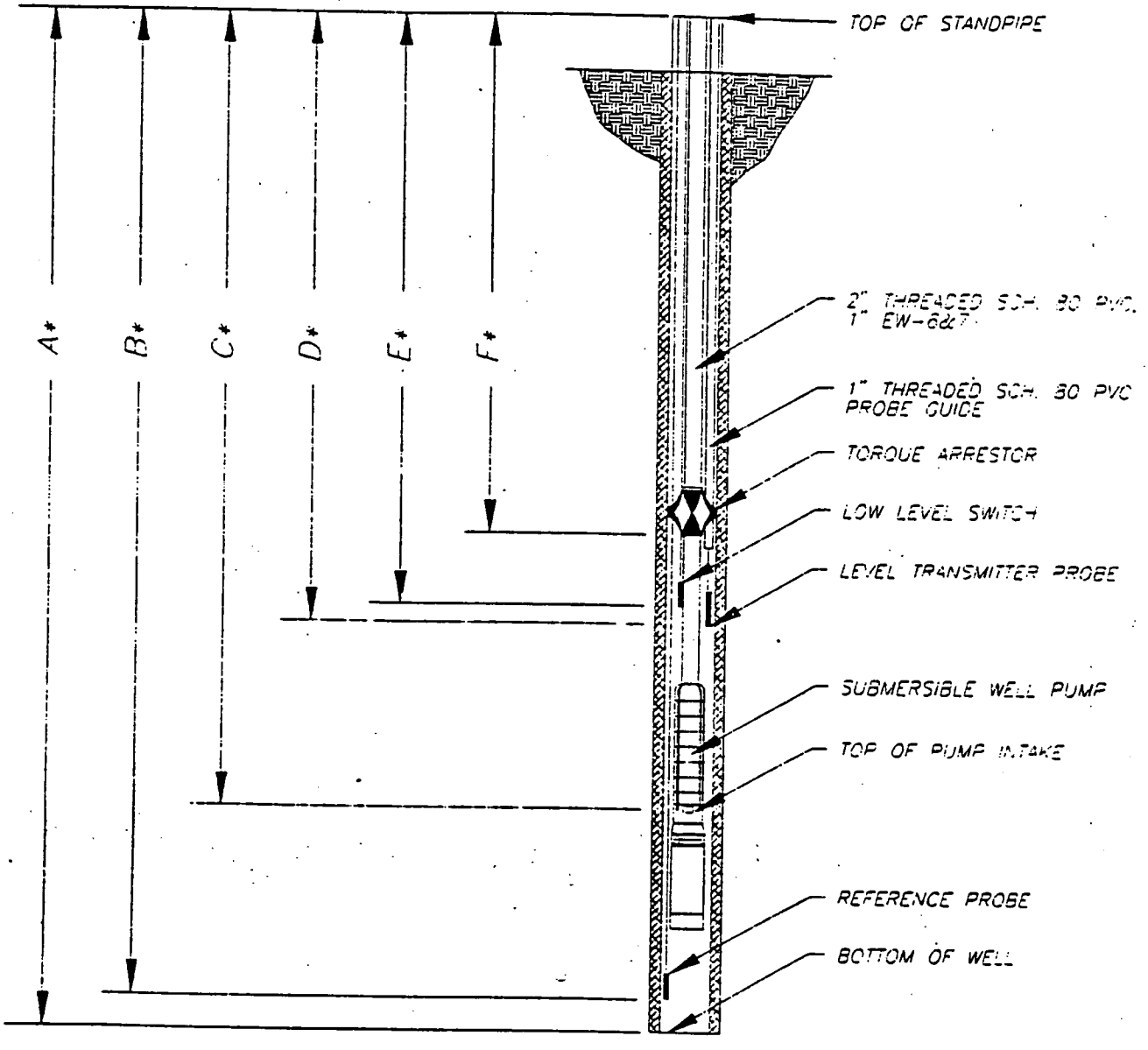
▼ = Water level at time of drilling

▼ = Water level measurement

SAA = Same as above

BALDWIN ENGINEERING, INC.

BNAS "AS-BUILT" EXTRACTION PUMPS



WELL	EW1	EW2	EW3	EW4	EW5	EW6	EW7
LETTER I.D.	DIMENSION	DIMENSION	DIMENSION	DIMENSION	DIMENSION	DIMENSION	DIMENSION
A*	101.60'	92.21'	67.30'	67.92'	88.00'	50.60'	39.11'
B*	98.60'	89.00	64.25'	63.00'	85.00'	49.10'	38.30'
C*	95.80'	86.00'	61.30'	60.00'	82.00'	47.83'	36.30'
D*	92.80'	83.20'	58.45'	57.00'	79.40'	45.00'	33.10'
E*	92.60'	83.00'	58.25'	57.00'	79.20'	44.83'	32.90'
F*	92.10'	82.38'	58.00'	56.00'	78.30'	44.20'	33.50'

RESTORATION ADVISORY BOARD MEETING
NAVAL AIR STATION, BRUNSWICK, MAINE
31 OCTOBER 1996

SUMMARY OF DIRECT-PUSH GROUND-WATER SAMPLING ACTIVITIES CONDUCTED IN VICINITY OF MW-311

OVERVIEW: Ground-water samples were collected from four direct-push locations to assess the horizontal and vertical distribution of dissolved-phase VOC near MW-311. Results indicate that the majority of VOC are present in the deep saturated interval (i.e., greater than 50 ft below grade).

PROCEDURE: Prior to collecting ground-water samples, electrical conductivity logging was performed to identify potential water-bearing intervals. A deep sand zone was identified at each direct-push location at variable depths, ranging from 49 to 61 ft below grade.

Direct-push ground-water samples were collected from 4 locations. One sample collection point (DP-01) was located approximately 100 ft to the north of MW-311 (Figure 1). Two sample collection points (DP-02 and DP-03) were located approximately 100 ft from MW-311 toward the southeast and west of MW-311, respectively. These two points were sited as close as possible to the Base boundary. One direct-push location (DP-04) was located approximately 5 ft from MW-311 to assess the comparability of direct-push sample results to the ground-water sample collected from MW-311 using low-flow technique.

Ground-water samples were collected from DP-01, DP-02 and DP-03 from three intervals; shallow (6 to 12 ft below grade), intermediate (32 to 38 ft below grade) and deep (50 to 58 ft below grade). One deep sample (52 to 54 ft) was collected from DP-04 from a depth concurrent with the screened interval of MW-311 (screened from 45 to 55 ft). Ground-water samples were analyzed for VOC by EPA Method 8260.

RESULTS: Shallow ground-water sample results reported concentrations of VOC below State MEG and Federal MCL at two locations, DP-01 and DP-03. Concentrations of VOC above State MEG and Federal MCL were reported at DP-02 (Figure 2).

The three ground-water samples collected from the intermediate interval reported no VOC above State MEG and Federal MCL (Figure 3).

The deep interval sample results reported concentration of VOC above State MEG and Federal MCL from the four direct-push samples and MW-311. The highest concentrations were reported at DP-04 (12,884 μ/L total VOC) and MW-311 (12,101 μ/L total VOC). Lower concentrations were reported at DP-02 (3,121 μ/L total VOC), DP-03 (2,657 μ/L total VOC) and DP-01 (102 μ/L total VOC). Deep ground-water samples at DP-03, DP-04 and MW-311 reported artesian conditions.

CONCLUSIONS: The highest concentrations of the dissolved-phase VOC are present predominantly in the deep sand zone. The areas around MW-311 and DP-04 reported the highest concentrations of VOC, with significantly lower concentrations reported from the deep sample collected at DP-01. The elevated concentrations of VOC reported from the shallow sample at DP-02 may indicate upward movement of VOC impacted ground-water, although the low reported concentrations of VOC from the intermediate samples do not confirm that VOC are moving vertically at this location.

TABLE 1 ANALYTICAL RESULTS FOR DIRECT-PUSH AND LOW FLOW SAMPLING CONDUCTED 4 SEPTEMBER 1996 NAVAL AIR STATION, BRUNSWICK, MAINE

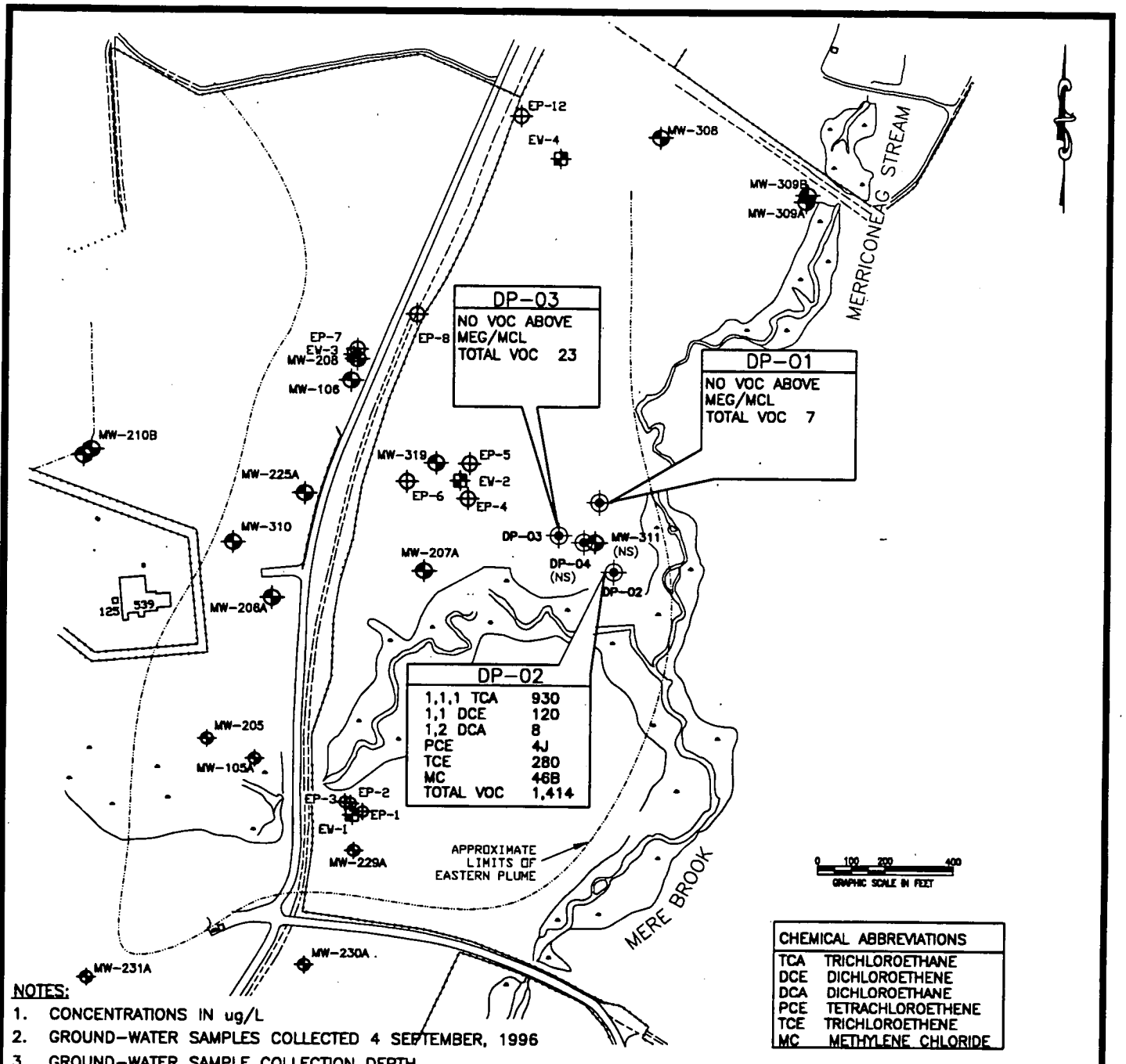
Analyte	PQL[a]	DP-01 Shallow (6-10 ft)	DP-01 Intermediate (32-33 ft)	DP-01 Deep (50-51 ft)	DP-02 Shallow (8-10 ft)	DP-02 Intermediate (37-41 ft)	DP-02 Deep (56-58 ft)	MEG[b]	MCL[c]
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260 (µg/L)									
1,1,1-Trichloroethane	1.0	(<1.0U)	(<1.0U)	2	**930**	2	**2,300**	200	200
1,1,2,2-Tetrachloroethane	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	(<1.0U)	(<10U)	---	---
1,1,2-Trichloroethane	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	(<1.0U)	(<10U)	3	5
1,1-Dichloroethane	1.0	(<1.0U)	(<1.0U)	50	23	(<1.0U)	48	70	---
1,1-Dichloroethene	1.0	(<1.0U)	(<1.0U)	**22**	**120**	0.8J	**210**	7	7
1,2-Dichloroethane	1.0	(<1.0U)	(<1.0U)	2	**8**	(<1.0U)	**13**	5	5
1,2-Dichlorobenzene	1.0	(<1.0U)	0.8JB	(<1.0U)	(<5.0U)	1	(<10U)	600	600
1,3-Dichlorobenzene	1.0	0.6JB	0.5JB	(<1.0U)	(<5.0U)	1B	(<10U)	27	75
1,4-Dichlorobenzene	1.0	0.7JB	0.9JB	0.5JB	(<5.0U)	2	(<10U)	27	75
2-Butanone	5.0	(<5.0U)	(<5.0U)	(<5.0U)	(<25U)	(<5.0U)	(<50U)	---	---
Acetone	5.0	(<5.0U)	(<5.0U)	(<5.0U)	(<25U)	11	(<50U)	---	---
Benzene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	(<1.0U)	(<10U)	5	5
Bromoform	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	(<1.0U)	(<10U)	---	100
Carbon disulfide	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	2	(<10U)	---	---
Chlorobenzene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	0.7J	(<10U)	47	100
Chloroform	1.0	(<1.0U)	(<1.0U)	(<1.0U)	3J	0.6J	6J	---	100
Ethylbenzene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	0.8J	(<10U)	700	700
Methylene chloride	1.0	4B	5B	**13B**	**46B**	2B	**86B**	---	5
Styrene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<5.0U)	0.6J	(<10U)	5	100
Tetrachloroethene	1.0	(<1.0U)	(<1.0U)	0.8J	**4J**	1	**8J**	3	5
Toluene	1.0	0.8J	0.6J	0.8J	(<5.0U)	1	(<10U)	1,400	1,000
Total 1,2-Dichloroethene	1.0	(<1.0U)	(<1.0U)	3	(<5.0U)	(<1.0U)	(<10U)	70	70
Total xylenes	1.0	0.5J	(<1.0U)	(<1.0U)	(<5.0U)	2	(<10U)	600	10,000
Trichloroethene	1.0	(<1.0U)	(<1.0U)	**8**	**280**	1	**450**	5	5

(a) PQL = Practical Quantitation Limit.
(b) Maximum Exposure Guideline (MEG) obtained from State of Maine Department of Human Services, Revised Maximum Exposure Guidelines, memorandum dated 23 October 1992. Dashes (---) indicate no MEG applicable.
(c) Maximum Contamination Level (MCL) obtained from 40 CFR Parts 141 and 142 (U.S. EPA 1994). Dashes (---) indicate no MCL applicable.

NOTE: J = Estimated concentration below detection limit.
B = Compound detected in associated method blank.
Only those analytes detected in at least one of the samples, and the contaminants of concern listed in the LTMP (ABB-ES 1994), are shown on this table.
Results in bold indicate concentrations above primary Federal MCL and/or State MEG.

Analyte	PQL[a]	DP-03 Shallow (10-12 ft)	DP-03 Intermediate (36-38 ft)	DP-03 Deep (56-58 ft)	DP-03 DUP Deep (56-58 ft)	DP-04 Deep (52-54 ft)	NASB-MW-311	Trip Blank TB-01	MEG[b]	MCL[c]
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260 (µg/L)										
1,1,1-Trichloroethane	1.0	0.9J	2	**2,100**	**1,900**	**9,500**	**8,700**	(<1.0U	200	200
1,1,2,2-Tetrachloroethane	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<50U)	(<1.0U)	1	---	---
1,1,2-Trichloroethane	1.0	(<1.0U)	(<1.0U)	**4**	**4**	(<50U)	**12**	(<1.0U	3	5
1,1-Dichloroethane	1.0	(<1.0U)	(<1.0U)	51	46	**83**	**80**	(<1.0U	70	---
1,1-Dichloroethene	1.0	(<1.0U)	(<1.0U)	**170**	**180**	**700**	**730**	(<1.0U	7	7
1,2-Dichloroethane	1.0	(<1.0U)	(<1.0U)	**12**	**12**	(<50U)	**33**	(<1.0U	5	5
1,2-Dichlorobenzene	1.0	0.7JB	(<1.0U)	(<1.0U)	(<1.0U)	40JB	(<1.0U)	2	600	600
1,3-Dichlorobenzene	1.0	0.7JB	(<1.0U)	(<1.0U)	(<1.0U)	**37JB**	(<1.0U)	2	27	75
1,4-Dichlorobenzene	1.0	0.8JB	0.5J	(<1.0U)	(<1.0U)	**50JB**	(<1.0U)	2	27	75
2-Butanone	5.0	6	(<5.0U)	(<5.0U)	(<5.0U)	(<250U)	(<5.0U)	(<5.0U	---	---
Acetone	5.0	11	10	10	(<5.0U)	190J	(<5.0U)	5	---	---
Benzene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<50U)	**7**	(<1.0U	5	5
Bromoform	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<50U)	(<1.0U)	0.6J	---	100
Carbon disulfide	1.0	1	2	1	2	(<50U)	(<1.0U)	(<1.0U	---	---
Chlorobenzene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<50U)	(<1.0U)	(<1.0U	47	100
Chloroform	1.0	(<1.0U)	0.8J	2	2	27J	6	(<1.0U	---	100
Ethylbenzene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<50U)	(<1.0U)	0.6J	700	700
Methylene chloride	1.0	0.6JB	4B	**27B**	**28B**	**360B**	**51B**	2B	---	5
Styrene	1.0	(<1.0U)	(<1.0U)	(<1.0U)	(<1.0U)	(<50U)	(<1.0U)	0.8J	5	1,000
Tetrachloroethene	1.0	(<1.0U)	(<1.0U)	**7**	**8**	**59**	**68**	0.6J	3	5
Toluene	1.0	0.9J	1	2	1	(<50U)	(<1.0U)	0.8J	1,400	10,000
Total 1,2-Dichloroethene	1.0	(<1.0U)	(<1.0U)	10	10	(<50U)	14	(<1.0U	70	70
Total xylenes	1.0	0.6J	(<1.0U)	1	(<1.0U)	38J	(<1.0U)	3	600	100
Trichloroethene	1.0	(<1.0U)	0.8J	**260**	**260**	**1,800**	**2,400**	(<1.0U	5	5

NOTE: DUP indicates duplicate sample.



CHEMICAL ABBREVIATIONS	
TCA	TRICHLOROETHANE
DCE	DICHLOROETHENE
DCA	DICHLOROETHANE
PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
MC	METHYLENE CHLORIDE

NOTES:

1. CONCENTRATIONS IN ug/L
2. GROUND-WATER SAMPLES COLLECTED 4 SEPTEMBER, 1996
3. GROUND-WATER SAMPLE COLLECTION DEPTH

SAMPLE ID	FT BELOW GRADE	FT MEAN SEA LEVEL (MSL)
DP-01	6 TO 10	14 TO 18
DP-02	8 TO 10	13 TO 15
DP-03	10 TO 12	10 TO 12

4. NS – NOT SAMPLED, DEEP SAMPLE ONLY
5. TAG BOXES SUMMARIZE VOC CONCENTRATIONS ABOVE STATE MEG OR FEDERAL MCL AND TOTAL VOC CONCENTRATIONS

LEGEND

- MONITORING WELL LOCATION
- DIRECT-PUSH GROUND-WATER SAMPLE LOCATION
- PEIZOMETER LOCATION
- EXTRACTION WELL LOCATION

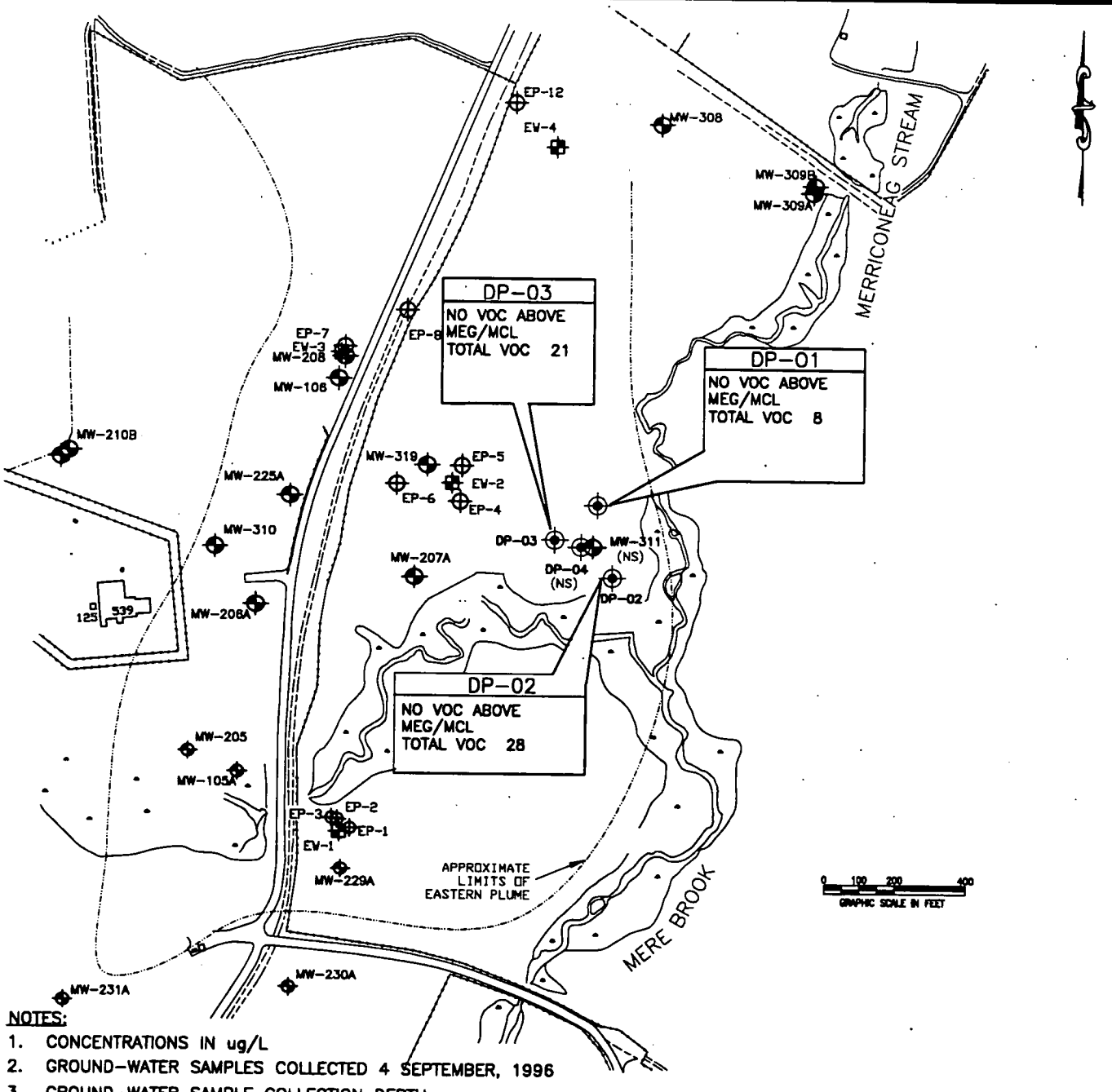
DWG. FILE No. F:\CAD\29600\47\MW311.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 2
SHALLOW DIRECT-PUSH GROUND-WATER ANALYTICAL RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
MSB	SY	SY	PLN	1" = 400'	21 OCT. 96	29600.47	MW311



NOTES:

1. CONCENTRATIONS IN ug/L
2. GROUND-WATER SAMPLES COLLECTED 4 SEPTEMBER, 1996
3. GROUND-WATER SAMPLE COLLECTION DEPTH

SAMPLE ID	FT BELOW GRADE	FT MEAN SEA LEVEL (MSL)
DP-01	32 TO 33	-8 TO -9
DP-02	37 TO 41	-14 TO -18
DP-03	36 TO 38	-13 TO -15

4. NS - NOT SAMPLED, DEEP SAMPLE ONLY
5. TAG BOXES SUMMARIZE VOC CONCENTRATIONS ABOVE STATE MEG OR FEDERAL MCL AND TOTAL VOC CONCENTRATIONS

LEGEND

- MONITORING WELL LOCATION
- DIRECT-PUSH GROUND-WATER SAMPLE LOCATION
- PIEZOMETER LOCATION
- EXTRACTION WELL LOCATION

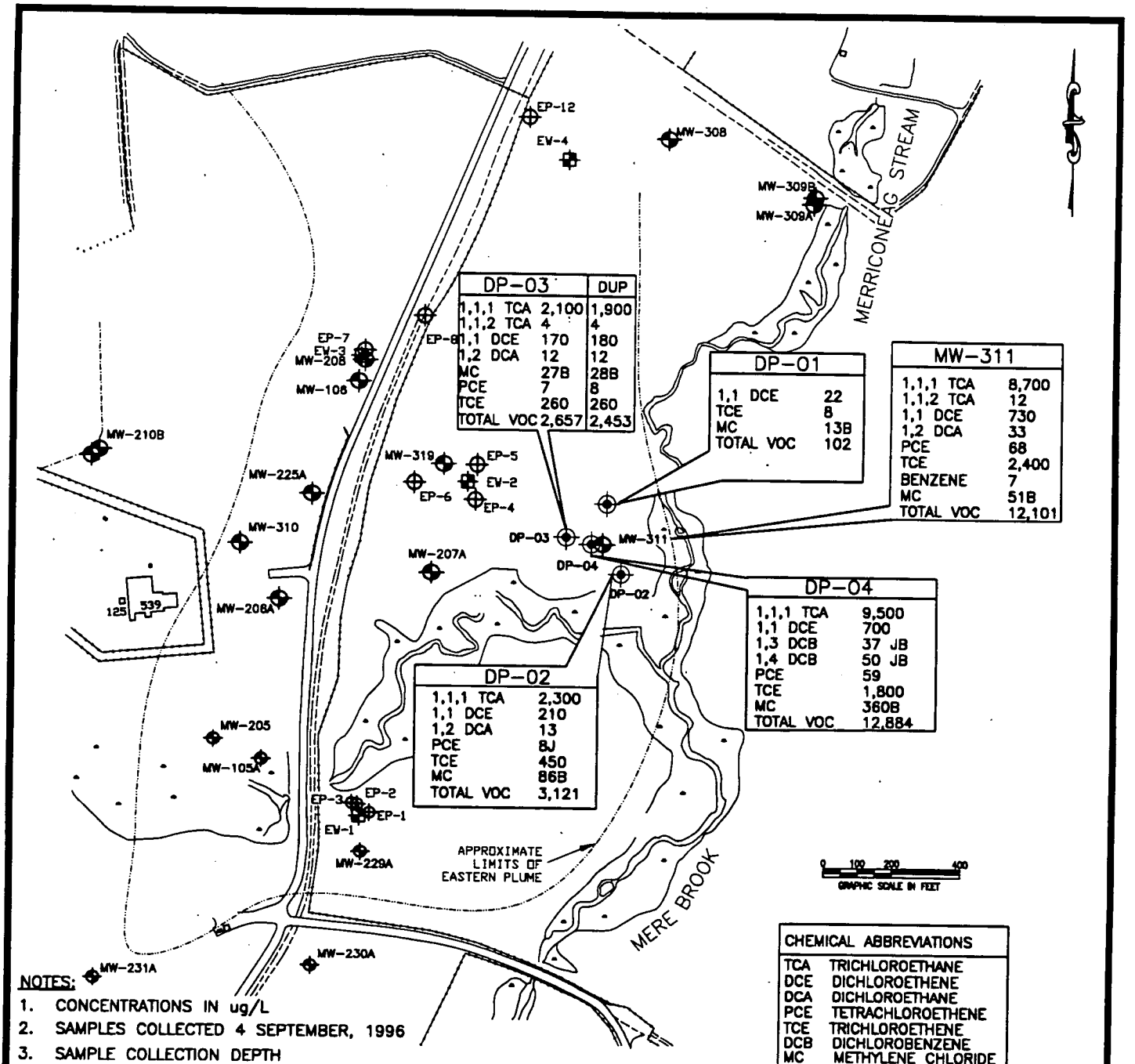
DWG. FILE No. F:\CAD\29600\47\MW311.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 3
INTERMEDIATE DIRECT-PUSH GROUND-WATER SAMPLE LOCATION MAP

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
MSB	SY	SY	PLN	1" = 400'	21 OCT. 96	29600.47	MW311



NOTES:

1. CONCENTRATIONS IN ug/L
2. SAMPLES COLLECTED 4 SEPTEMBER, 1996
3. SAMPLE COLLECTION DEPTH

SAMPLE ID	FT BELOW GRADE	FT MEAN SEA LEVEL (MSL)
DP-01	50 TO 51	-26 TO -27
DP-02	56 TO 58	-33 TO -35
DP-03/DUP	56 TO 58	-33 TO -35
DP-04	52 TO 54	-28 TO -30

4. DUP - DUPLICATE
5. TAG BOXES SUMMARIZE VOC CONCENTRATIONS ABOVE STATE MEG AND FEDERAL MCL AND TOTAL VOC CONCENTRATIONS

CHEMICAL ABBREVIATIONS	
TCA	TRICHLOROETHANE
DCE	DICHLOROETHENE
DCA	DICHLOROETHANE
PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
DCB	DICHLOROBENZENE
MC	METHYLENE CHLORIDE

LEGEND

- MONITORING WELL LOCATION
- DIRECT-PUSH GROUND-WATER SAMPLE LOCATION
- PEIZOMETER LOCATION
- EXTRACTION WELL LOCATION

DWG. FILE No. F:\CAD\29600\47\MW311.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 4
DEEP DIRECT-PUSH GROUND-WATER SAMPLE LOCATION MAP

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
MSB	SY	SY	PLN	1" = 400'	21 OCT. 96	29600.47	MW311

RESTORATION ADVISORY BOARD MEETING
NAVAL AIR STATION, BRUNSWICK, MAINE
31 OCTOBER 1996

SUMMARY OF PROPOSED TESTING PROCEDURE FOR USE OF INFLATABLE PACKERS IN EXTRACTION WELLS

OVERVIEW: Testing of inflatable packer technology is warranted at this time to assess the potential to increase effective zone of capture of extraction wells, and to maximize removal of dissolved-phase VOC from the deep saturated zone.

TEST LOCATION: Extraction Well EW-5; pump set between 65-80 ft below surface grade; inflatable packer set at approximately 60 ft below surface grade (Figure 1).

TEST PROCEDURE (PRELIMINARY)

- Install inflatable packers at interface between transition zone and deep portion of aquifer, both within extraction well and gauging tube (based on results of geophysical logging).
- Install pressure transducers in extraction well at depths above and below packer to monitor and record drawdown aquifer response in both shallow and deep portions of aquifer. Install pressure transducers in neighboring wells and piezometers to monitor and record drawdown in shallow and deep portions of aquifer. Commence monitoring prior to resetting pump depth.
- Extract ground water at highest sustainable pumping rate.
- Perform 3-day constant rate test to monitor extraction rate, drawdown, and dissolved-phase VOC removal; evaluate these data in comparison with data obtained during previous testing, and actual extraction well performance to date. Collect ground-water samples for VOC analysis by EPA Method 8260 on a daily basis to monitor trend in VOC concentration versus time, and to provide comparison with previously collected baseline data.
- Continue ground-water extraction activities with packer set-up to monitor long-term aquifer response to pumping from deep portion of aquifer. Collect well gauging and chemical water quality (VOC) data on a routine basis (to be discussed with RAB).

DATA ANALYSIS AND PRESENTATION

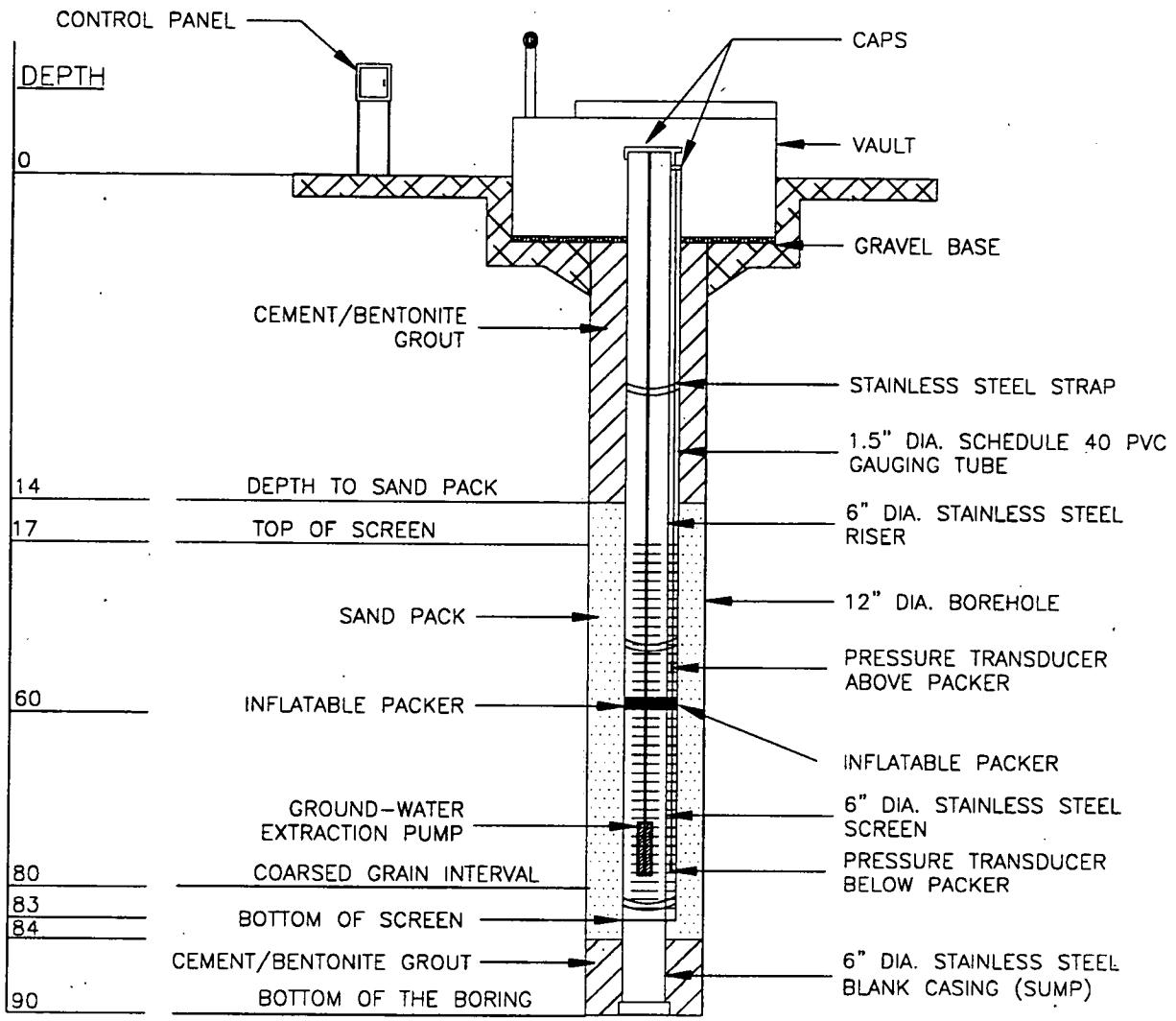
- Prepare summary report providing comparison of VOC removal efficiency and effective zone of capture under both ground-water extraction scenarios (i.e., with/without use of packers). Provide recommendations based on results.

POTENTIAL ACTIONS BASED ON STUDY RESULTS

- Expand application of packer technology to additional extraction wells. Consider installation of permanent packers (non-inflatable) if warranted.

or

- Implement an alternate course of action for maximizing removal of dissolved-phase VOC and maintaining hydraulic control of deep portion of aquifer (i.e., extraction well rehabilitation or installation of redesigned extraction wells).



EA ENGINEERING, SCIENCE, AND TECHNOLOGY	EASTERN PLUME NAVAL AIR STATION BRUNSWICK, MAINE				FIGURE 1 PUMPING SCENARIO WITH INFLATABLE PACKER INSTALLED IN EW-5		
PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE NO
MSB	PLN	SY	PLN	NA	30 OCT 1996	29600.47	EW-5